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November 6, 2012

EX PARTE PRESENTATION

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Ex Parte Presentation in WT Docket No. 12-70, *Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands*; ET Docket No. 10-142, *Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz*; and WT Docket No. 04-356, *Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands*

Dear Ms. Dortch:

Pursuant to Section 1.1206 of the Commission's rules, 47 C.F.R. § 1.1206, DISH Network Corporation ("DISH") submits this letter in response to *ex parte* letters filed by Sprint Nextel Corporation ("Sprint") on October 10, 2012 (as clarified and corrected by its subsequent October 11, 2012 letter),[1] October 31, 2012,[2] and November 2, 2012.[3] In these letters, Sprint advocates for unprecedented technical restrictions on mobile broadband in the AWS-4 band that would harm competition and are unnecessary given the low-probability of occurrence and interference mitigation techniques available with LTE networks. Sprint's concerns about the use of the H Block (1915-1920 MHz; 1995-2000 MHz) for small cell LTE networks are equally misguided, because they fail to account for interference concerns that Sprint itself has raised and misconstrue the effect of small cells on adjacent licensees.

[1] Letter from Lawrence Krevor and Rafi Martina, Sprint Nextel Corporation, to Marlene H. Dortch, Secretary, FCC, WT Dkt. Nos. 12-70, 04-356, ET Dkt. No. 10-142 (Oct. 10, 2012), *as clarified and revised by* Letter from Lawrence Krevor and Rafi Martina, Sprint Nextel Corporation, to Marlene H. Dortch, Secretary, FCC, WT Dkt. Nos. 12-70, 04-356, ET Dkt. No. 10-142 (Oct. 11, 2012) (together, the "Sprint OOBE Letter").

[2] Letter from Marc S. Martin, Counsel to Sprint Nextel Corporation, to Marlene H. Dortch, Secretary, FCC, WT Dkt. Nos. 12-70, 04-356, ET Dkt. No. 10-142 (Oct. 31, 2012) ("Sprint Small Cell LTE Letter").

[3] Letter from Marc S. Martin, Counsel for Sprint Nextel Corporation, to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Dkt. Nos. 12-70, 04-356, ET Dkt. No. 10-142 (Nov. 2, 2012) ("Sprint Nov. 2 Ex Parte").

I. Sprint's Rebuttal of DISH's H Block Proposals Misunderstands Technical Facts and Contradicts Sprint's Prior Statements.

DISH disagrees both with Sprint's assessment of the potential value of the H Block at auction if designated for small-cell LTE networks and with Sprint's view of the relevant interference characteristics of such a network architecture. As DISH has explained, potential low-power uses of the H Block for LTE small cells could represent a win-win for mobile broadband competition by increasing the chances of a successful H Block auction and facilitating mobile broadband usage of the entire 10 MHz H Block, while preserving all 40 MHz of AWS-4 spectrum.[4]

First, DISH's suggestion for low-power, small cell LTE networks will not in fact reduce H Block's value in a future auction. According to Sprint's view of the world, H Block can and should be used for full-power LTE, and DISH's proposal to limit its use to low-power small cell networks undermines that approach. This is false. Sprint *itself* has already advocated for low-power use of the H Block to resolve interference issues with H Block's uplink (1915-1920 MHz). By Sprint's own admission, use of the H Block uplink may cause interference to adjacent downlink operations in the G block and PCS band. Sprint explained that "H Block uplink operations at 1915-1920 MHz would pose a serious interference threat to G Block transmissions and other PCS operations," and "[a]t a minimum, new 1917-1920 MHz users would need to be subject to restrictive transmitter power and OOBE limits to protect the millions of existing PCS devices operating in the 1930-1990 MHz band from harmful intermodulation interference."[5] Nor should the Commission entertain Sprint's threat that it "likely would not bid on the H Block if it were restricted to small cell use or air-to-ground communications."[6] Any such claims are posturing on Sprint's part. In any case, if the Commission auctions the H Block for low-power small cell LTE use, DISH would participate in the auction and would put the H Block to productive use.

Second, DISH disagrees with Sprint's view that using the H Block for low-power would "conflict[] with the ongoing evolution in broadband network architecture, by which small cells are interspersed with macro cells using the same spectrum to enhance network coverage."[7] Full-power operations in the H Block are not feasible due to the interference issues with the H Block uplink that Sprint has already identified. Therefore, as a practical matter, it is highly unlikely that any operator would deploy a mix of small cells and full-power macro cells all using the H Block frequencies. But the more important point is that DISH's suggestion does not limit the use of small-cell LTE networks in the H Block to provide coverage enhancements for macro cells. Indeed, DISH's suggestion is that small cells in the H Block could be used to fill in coverage for

[4] Letter from Jeffrey H. Blum, DISH Network Corporation, to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Dkt. Nos. 12-70, 04-356, ET Dkt. No. 10-142, at 2 (Oct. 22, 2012).

[5] Comments of Sprint Nextel Corporation, ET Dkt. No. 10-142, WT Dkt. Nos. 04-356 and 07-195, at 4 (July 8, 2011).

[6] *See* Sprint Nov. 2 Ex Parte at 2.

[7] *See* Sprint Small Cell LTE Letter at 2.

macro cells operating on separate frequencies. LTE standards development embraces this arrangement, as evidenced throughout the Small Cell Enhancement Work Item being developed in 3GPP Release 12, where the focus is when "different frequency bands are separately assigned to macro layer and small cell layer."[8]

Third, Sprint states that restricting H Block to small cell networks "would create unnecessary technical challenges for device manufacturers and service providers that could harm the customer experience." To the contrary, Sprint's *own proposals* would limit the device capabilities. As noted above, Sprint has recommended that "[a]t a minimum, new 1917-1920 MHz users would need to be subject to restrictive transmitter power and OOBE limits to protect the millions of existing PCS devices operating in the 1930-1990 MHz band from harmful intermodulation interference" from the H Block uplink at 1915-1920 MHz.[9] Since LTE networks are limited by the reverse link coverage (*i.e.*, the uplink path from the device back to the base station), it would be unnecessary to operate the base station at full power in the H Block downlink (1995-2000 MHz). Because the H Block device would be transmitting at lower power at 1915-1920 MHz consistent with Sprint's recommendation, the device can only *receive* at those lower power levels in the H Block downlink at 1995-2000 MHz. Any added power from the base stations will simply be *wasted* in the downlink at 1995-2000 MHz due to the device limitations. Therefore, an efficient technical solution is the very type of small cell deployments that DISH has suggested for the H Block.

Fourth, Sprint is wrong when it states that "a proliferation of non-collocated small cells could actually pose a greater interference risk to DISH's S-Band operations." The interference issue posed by a full-power LTE base station (macro cell) is profoundly and mathematically distinct from a proliferation of small cells. Current 3GPP standards identify the output power rating of an LTE small cell somewhere between 20 and 24 dBm for one antenna port. The full power rating of an LTE base station, by contrast, is normally 43 dBm. When also considering antenna gain, which is greater for a full power base station, the EIRP difference between a full power and a small cell power LTE could be as much as **30 dB**. Put differently, LTE small cells radiate approximately 1/1000th of the power of a full power LTE base station. Additionally, small cells could be used for indoor applications and lower heights as opposed to macro cells operating outdoors on tall towers and buildings with line-of-sight to the AWS-4 base station receivers. The attenuation from indoor building locations and low heights could be approximately an additional 30-50 dB. Given the reduced power of 1/1000th of a macro cell, and the additional attenuation of the power due to lower heights and indoor placement, it is technically impossible for even the most densely deployed small cell network (assume an unrealistic case of 1000 small cells within a single macro cell coverage area) to even be close to the powers emitted from a single macro cell. Sprint cannot credibly argue that LTE small cells pose a greater interference risk as compared to full-power base stations.

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[8] 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Scenarios and Requirements for Small Cell Enhancement for E-UTRA and E-UTRAN; (Release 12) *available at* http://www.3gpp.org/ftp/Specs/archive/36_series/36.932/36932-020.zip.

[9] *See supra* note 5.

II. Sprint's Proposed Power Limits Are Unnecessary as a Technical Matter and Unprecedented in the Commission's Spectrum Management Policies.

The Commission should reject Sprint's last minute push to redirect the forthcoming AWS-4 rules away from the market-oriented, technically flexible approach for adjacent operations proposed in the *AWS-4 NPRM*.[10] Sprint's call for an out-of-band-emissions ("OOBE") limitation of 70+10 log(P) dB (-40 dBm/MHz) for AWS-4 operations at 2000 MHz[11] would be highly restrictive and unnecessary, and will limit that band's uplink capacity as compared with other mobile wireless bands and reduce its viability for provisioning a competitive broadband service. The Commission should instead follow its precedent for efficient broadband spectrum and adopt a technically flexible OOBE standard of 43 +10 log(P) for AWS-4 OOBE at 2000 MHz. This widely used and accepted OOBE limit would encourage market forces (either by agreement between licensees or through coordination in technical standards bodies such as 3GPP) to determine the best ways to optimize the use of both AWS-4 and the H Block.

A. Sprint's Proposed OOBE Limits for AWS-4 Would Mark a Steep Departure from Levels Set for Other Mobile Broadband Spectrum Bands.

Sprint's request for an H Block protection level of 70+10log(P) dB at 2000 MHz is an unnecessary level of protection for immediately adjacent spectrum bands, and represents an arcane "command and control" approach to spectrum management. The H Block is not licensed today. There are no consumers using H Block devices, nor is any commercial operator in a position to even plan a deployment for H Block. If the Commission were to concede to Sprint's arbitrary demands, such an action would protect and favor an unassigned band over the adjacent operations of an existing licensee (DISH) that stands ready to deploy a new competitive LTE Advanced mobile broadband network.

Moreover, Sprint's power levels, if adopted, would reverse course against a wave of Commission precedent allowing technically flexible service. Over the past 20 years, the Commission has used a flexible spectrum management regime that has enabled widespread adoption of mobile services and the deployment of nearly 500 MHz of broadband capable spectrum, including the PCS, AWS-1, 700 MHz and BRS/EBS bands. In its recent broadband service rules orders prior to the auctioning of the 700 MHz spectrum in 2007, the Commission laid out a long term vision for its spectrum management policy and concluded that it did not need to impose guard bands and unnecessarily costly and burdensome technical rules for enabling

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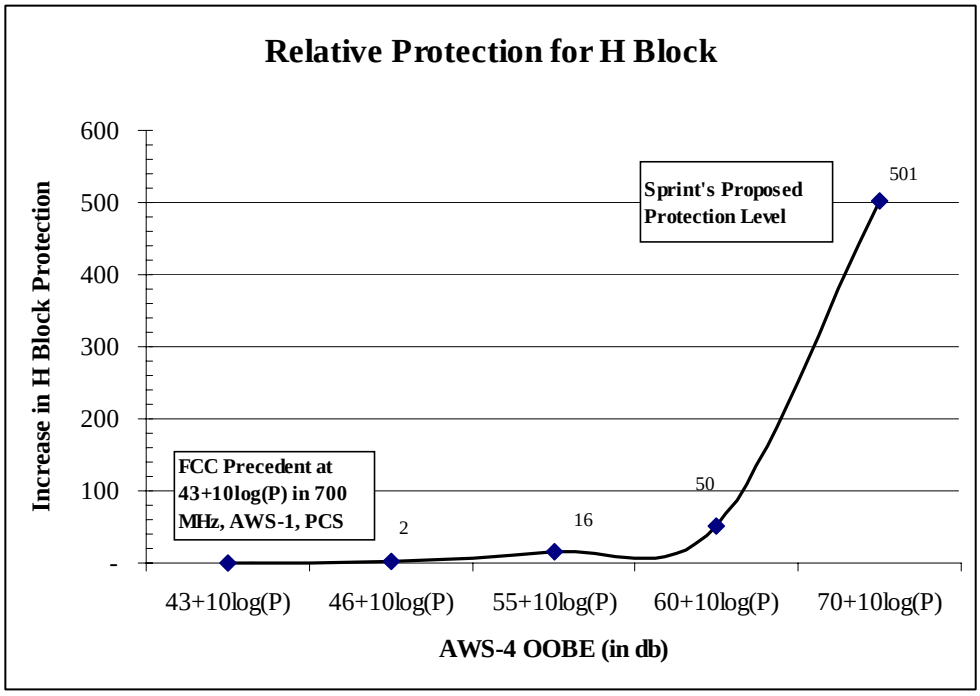
[10] Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands, WT Docket No. 12-70, Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz, ET Docket No. 10-142, Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands, WT Docket No. 04-356, *Notice of Proposed Rulemaking and Notice of Inquiry*, FCC 12-32, ¶ 33 (rel. Mar. 21, 2012) ("*AWS-4 NPRM*").

[11] *See* Sprint OOBE Letter at 2 (imposing a limit of 70+10log(P) at the 2000 MHz H Block band edge "should produce a broadband-viable H Block").

adjacent band operations.[12] The Commission instead used flexible rules based on its standard OOBE of 43 +10 log(P) dB to address potential interference for those situations where mobile transmit operates adjacent to mobile receive.

Here, Sprint's proposal for OOBE limits at 2000 MHz gives the future H Block licensee unnecessary and highly burdensome protection that is a stark departure from FCC precedent, because it would limit out-of-band emissions to less than 0.2 percent or 1/500th of what was permitted in AWS-1, PCS, BRS and 700 MHz bands for immediately adjacent band operation protection.[13] Figure 1 is an illustration of the protection level increase relative to the Commission's regular 43+10 log(P) dB limit:

FIGURE 1:



[12] *See generally* Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, *Report and Order*, WT Docket No. 06-150, 22 FCC Rcd 9100 (2007).

[13] An OOBE limit of 70 + 10 log (P) dB applies at 1995 MHz for emissions from the S-Band edge at 2000 MHz, but with a 5 MHz frequency separation over which to achieve the required limit. Moreover, 70 + 10 log (P) dB was imposed in 2003 when terrestrial operations in the S-Band were a secondary, ancillary service rather than a primary terrestrial LTE network. *See* Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands; Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands, IB Docket Nos. 01-185, 02-364, *Report and Order and Notice of Proposed Rulemaking*, 18 FCC Rcd 1962, ¶119 (2003).

Other mobile broadband spectrum bands are operating based on established limits such as 43 + 10 log(P) dB, or even in certain cases 16 times the protection level is granted through an OOBE limit of 55 + 10 log (P).[14] A 500-fold increase in protection would result from Sprint's proposed OOBE limit of 70 + 10 log (P) dB at 2000 MHz. This level is unnecessary and unwarranted, especially when the frequency separation between the transmit and receive bands is so low that the entire burden of meeting such a level is placed on the transmitting signal (AWS-4). As such, the Commission need only rely on its well-established precedent of 43+10log(P) dB as the appropriate regulatory requirement for AWS-4.

B. The Potential for Harmful Interference from AWS-4 Into H Block is Highly Unlikely and LTE Technology Provides Solutions to Avoid These Low Interference Risks.

Sprint's requested OOBE limits for AWS-4 would guard against a *highly probabilistic* event where the H Block mobile device (which is trying to receive from the base station) could potentially receive harmful interference from the AWS-4 mobile device (which is transmitting back to the base station). In order for there to be a harmful interference in this scenario, there must be a simultaneous occurrence of several events:

(1) The receiving mobile (in this case the H Block mobile device) needs to be at a "worst case" condition of its receiving link with respect to the base station it is in communication with. This would occur, for example, where the mobile is at the edge of the coverage of the transmitting base station or when the mobile is indoors in an area with large penetration loss from the buildings trying to receive a signal from the base station;

(2) The transmitting (AWS-4) mobile also needs to be at its highest transmit power condition to establish a link. This could occur where the AWS-4 mobile is at the edge of the coverage of the receiving base station or when the mobile is transmitting indoors and needs to increase its power to communicate with the receiving base station; and

(3) Both mobile devices would need to be within a 1-3 meters of each other.

The probability of these three events all happening at the same time is extremely low, making harmful interference from AWS-4 an unlikely event. In addition, the H Block will likely be used as a carrier aggregation LTE band to other spectrum. In this case, the effect of any low-probability mobile to mobile interference from AWS-4 to H block will be even more negligible. In the unlikely event that a high-power AWS-4 device is operating within a few meters of the H Block device, the H Block device will automatically default to an alternative downlink frequency (AWS-1, PCS, 700 MHz, 800 MHz).

[14] OOBE differences appear deceptively minute at first glance. However, these numbers are based on a log scale. So, for example, a 3dB increase (to 46 +10 log (P)) results in a 50% reduction in emissions.

III. Sprint's Assessment of the Impact Full-Power H Block Operations on AWS-4 is Technically Flawed and Impractical.

The Commission should reject Sprint's self-serving attempt to justify full-power H Block operations. None of Sprint's suggested interference mitigation techniques are sound or practical, and Sprint has failed to establish that the public interest is served if full-power operations in the H Block cause DISH, a new entrant, to lose, at least, 25 percent of its uplink spectrum.

First, it is not feasible for DISH to protect itself from blocking interference from H Block operations through the use of filters.[15] DISH has conferred with leading infrastructure manufacturers regarding the design and performance of base station filters, and they all have confirmed that frequency separation is required in order to reject in-band power from the H Block base station. Filters alone are not sufficient, and Sprint provided no technical analysis or filter specifications to show otherwise.

Second, Sprint's suggestion that co-location would resolve base station to base station interference is equally impractical.[16] Given that H Block is not yet licensed, AWS-4 base stations would likely already be constructed and operational at the time of H Block base station deployment. DISH cannot anticipate today where a future H Block operator will locate its sites, and thus cannot ensure that it would be able to co-locate its base stations with the H Block operator in the way Sprint suggests. Even in the unlikely event that the H Block operator were to deploy sites in advance of the AWS-4 deployment, many site locations are not amenable to the exacting co-location approach required to reduce interference. Among other things, the two sets of base stations must be located in the same vertical plane to take advantage of the greater physical isolation offered by co-location. This is a particular challenge in urban deployments, because rooftop sites rarely offer the necessary type of spatial isolation.

Third, Sprint's attempt to justify the elimination of at least 5 MHz of DISH's uplink based on asymmetry of wireless traffic is misguided.[17] DISH needs more spectrum, not less, in order to have a chance to be successful, and any impairment is harmful to that goal. DISH is not aware of Sprint ever proposing to return or repurpose any of its PCS uplink spectrum based on the asymmetrical nature of wireless traffic, and there is no justification to impose such a penalty on DISH.

Finally, the several interference mitigation mechanisms made available with LTE technology will not address the harmful interference impact to DISH's base stations from full-power H Block operations. The impact of receiver blocking is an overall increase in the noise floor. None of the techniques Sprint mentions,[18] such as intra-cell orthogonality, dynamic

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[15] *See* Sprint Nov. 2 Ex Parte at 2-3 (arguing that "DISH could reduce the potential for blocking interference from H Block base stations by installing adequate filtering on their AWS-4 base stations and by collocating their base stations with H Block base stations").

[16] *Id.*

[17] *Id.* at 3.

[18] *Id.* at 3-4.

bandwidth allocation, and inter-cell interference coordination, would be capable of correcting base station receiver overload from a full-power H Block transmitter. These types of mitigation techniques are appropriate more for mobile-to-mobile interference.

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In short, DISH urges the Commission to adopt the widely accepted OOBE standard of 43 + 10log(P) dB for the 2000 MHz edge of the AWS-4 band, as proposed in the *AWS-4 NPRM*. Adopting more stringent limits is unnecessary as a technical matter, unprecedented compared to other mobile broadband spectrum bands, and would preclude more efficient, market-based solutions for resolving the possibility of mutual interference. The H Block can be fully utilized for mobile broadband using small-cell LTE networks, and such an approach enables DISH to maximize its use of the AWS-4 band for new competitive mobile broadband services.

Respectfully submitted,

/s/ Jeffrey H Blum
Jeffrey H. Blum